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審査請求　未請求　請求項の数 1　（全5頁）

㊹考案の名称　車両用走行方位検出装置

㉑実　願　昭63－70093
㉒出　願　昭63(1988)5月27日

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㉔代理人　弁理士　和田　成則

㊼実用新案登録請求の範囲

地磁気センサにより検出される地磁気成分を、水平面上で互いに直交する2方向の成分に分解し、両地磁気成分が示す座標位置へ該位置が含まれるべき出力円の中心座標値から向かう方向に基づいて、車両の走行方位を検出する車両用走行方位検出装置において、

ジャイロセンサにより走行方位変化量を検出するジャイロ式走行方位変化量検出手段と、

一定距離走行中、出力円上において地磁気センサによつて検出される出力点移動量と、ジャイロセンサによつて検出される出力点移動量の差を求め、該移動量差に基づき周囲の磁場環境の良否を判別する磁場環境判別手段と、

上記判別された磁場環境に基づき、地磁気センサ出力値のサンプリングデータ数を算出するサンプリングデータ数算出手段と、

上記サンプリングデータの平均値データを複数地点にわたつて記憶する平均値データ記憶手段と、

上記記憶された複数地点の平均値データから選ばれる2地点の平均値データに基づいて出力円の中心点候補値を算出する中心点候補値算出手段と、

上記算出された中心点候補値の算出精度を演算する中心点候補値算出精度演算手段と、

上記演算された中心点候補値算出精度に基づき、従来の出力円中心点と上記算出された中心点候補値間に中心点を補正する中心点補正手段と、

を有することを特徴とする車両用走行方位検出装置。

図面の簡単な説明

第1図は本考案のクレーム対応図、第2図は本考案が適用された実施例装置の基本構成を示すブロック図、第3図は同実施例装置の処理手順を示すゼネラルフローチャート、第4図は方位位置演算割込処理の処理手順を示すフローチャート、第5図は距離検出割込処理の処理手順を示すフローチャート、第6図は地磁気センサによつて検出される出力点移動量とジャイロセンサによつて検出される出力点移動量の説明図、第7図は最小サンプリングデータ数の算出説明図、第8図は基準変数E_Rの説明図、第9図は基準変数E_θの説明図、第10図は基準変数E_Tの説明図、第11図は出力点候補値検出作用説明図、第12図は算出精度に基づく中心点補正作用説明図、第13図はスタックエリアBにプッシュされた平均値データの組合せ説明図、第14図は前回処理時と今回処理時に共通平均値データが使用される場合の説明図である。

1……距離センサ、2……地磁気センサ、3……ジャイロセンサ、4……コントローラ、5……表示装置。

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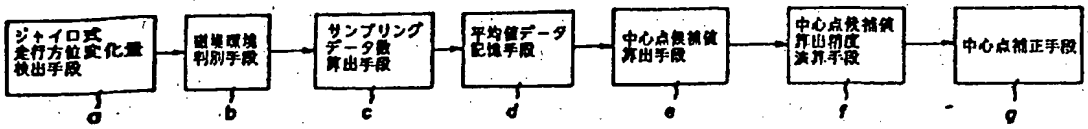
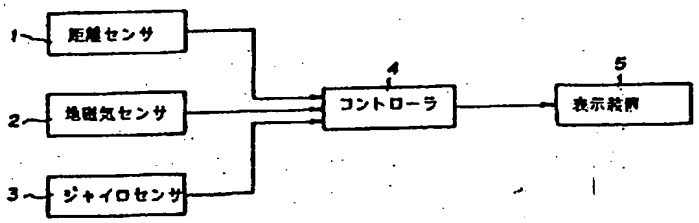
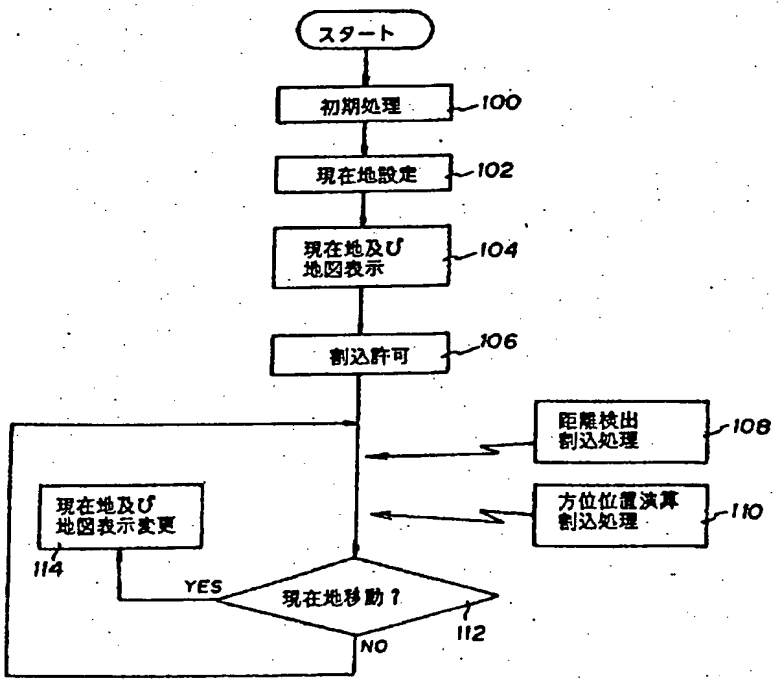
第 1 図


ジャイロ式
走行方位変化量
検出手段
a
磁場環境
判別手段
b
サンプリング
データ数
算出手段
c
平均値データ
記憶手段
d
中心点検補償
算出手段
e
中心点検補償
算出精度
演算手段
f
中心点補正手段
g

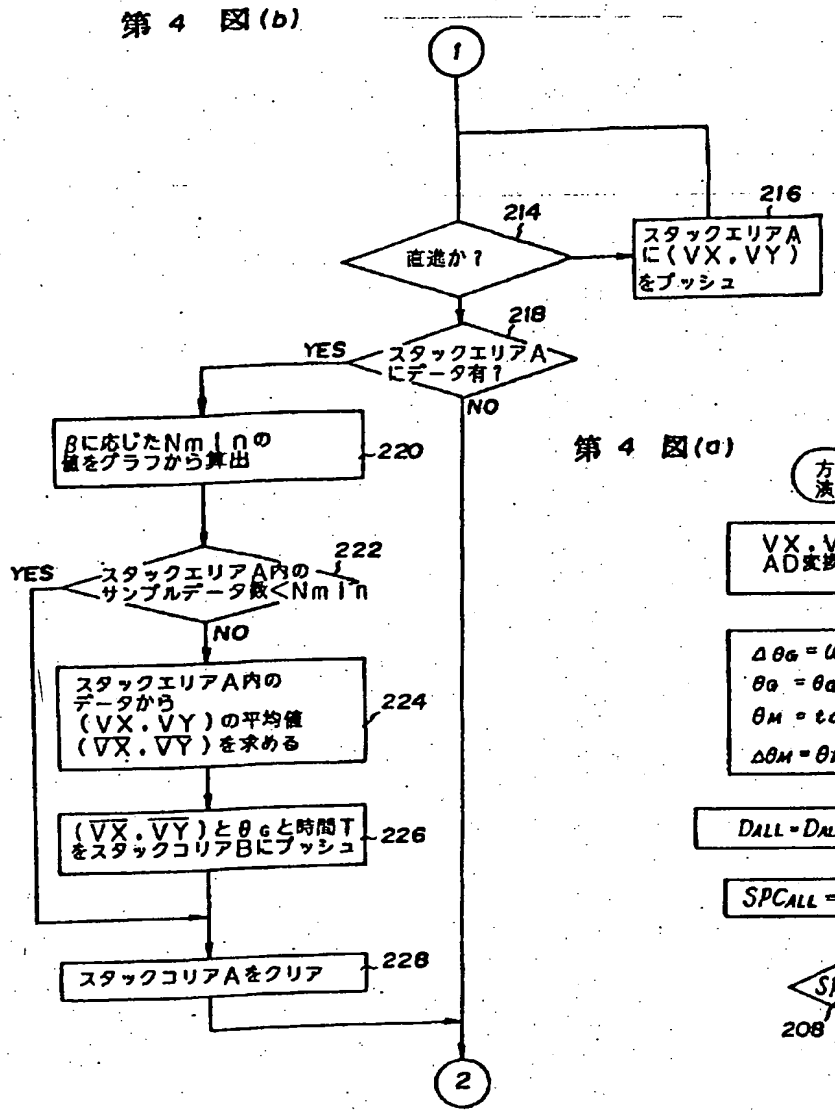
第 2 図


1
距離センサ
2
地磁気センサ
3
ジャイロセンサ
4
コントローラ
5
表示装置

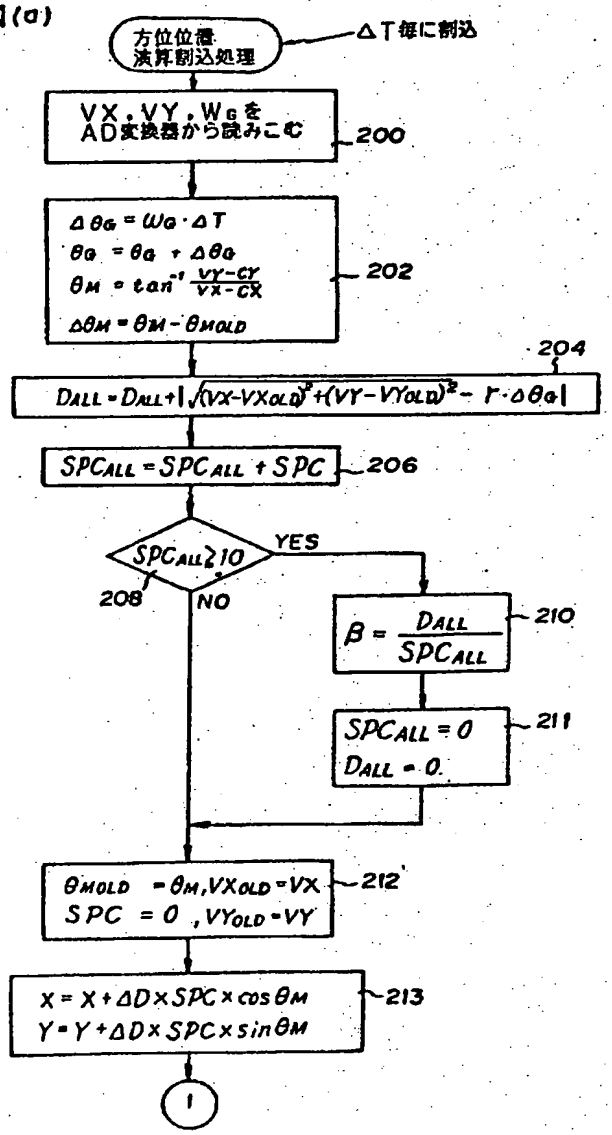
第 3 図


スタート
初期処理
100
現在地設定
102
現在地及び
地図表示
104
割込許可
106
距離検出
割込処理
108
方位位置演算
割込処理
110
現在地及び
地図表示変更
114
YES
現在地移動？
112
NO

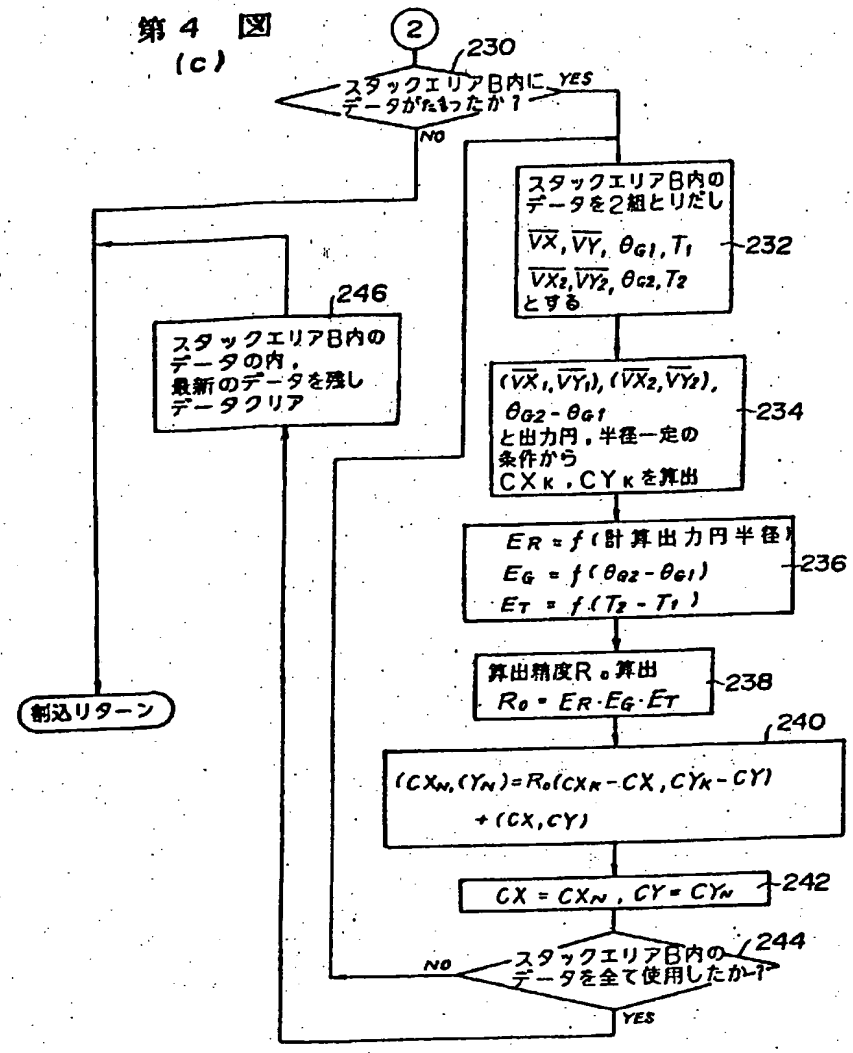
第 4 図(b)


1
214
直進か？
216
スタックエリアA
に(VX,VY)
をプッシュ
218
YES
スタックエリアA
にデータ有？
NO
βに応じたNmInの
値をグラフから算出
220
YES
スタックエリアA内の
サンプルデータ数<NmIn
222
NO
スタックエリアA内の
データから
(VX,VY)の平均値
(V̄X,V̄Y)を求める
224
(V̄X,V̄Y)とθGと時間T
をスタックコリアBにプッシュ
226
スタックコリアAをクリア
228
2

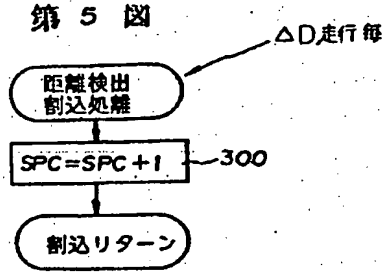
第 4 図(a)


方位位置
演算割込処理
ΔT毎に割込
VX,VY,WGを
AD変換器から読みこむ
200
ΔθG = WG·ΔT
θG = θG + ΔθG
θM = tan⁻¹ (VY−CY)/(VX−CX)
ΔθM = θM − θMOLD
202
204
DALL = DALL + |√((VX−VXOLD)²+(VY−VYOLD)²) − r·ΔθG|
SPCALL = SPCALL + SPC
206
SPCALL≧10
208
YES
NO
β = DALL/SPCALL
210
SPCALL = 0
DALL = 0.
211
θMOLD = θM, VXOLD = VX
SPC = 0, VYOLD = VY
212
X = X + ΔD × SPC × cos θM
Y = Y + ΔD × SPC × sin θM
213
1

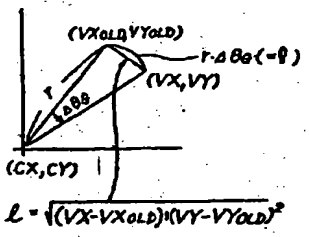
第4図 (c)



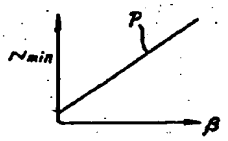
第5図



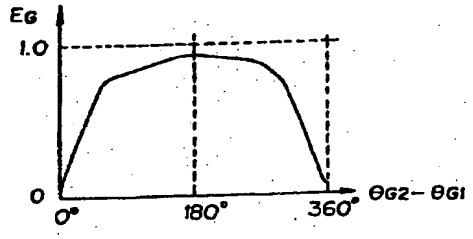
第6図



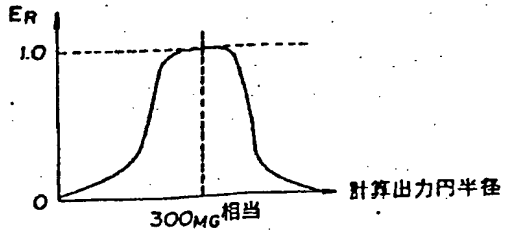
第7図



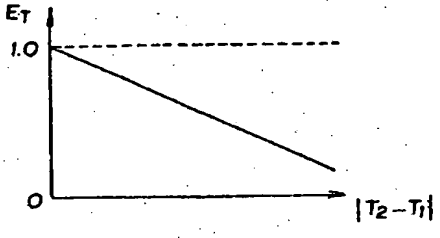
第9図



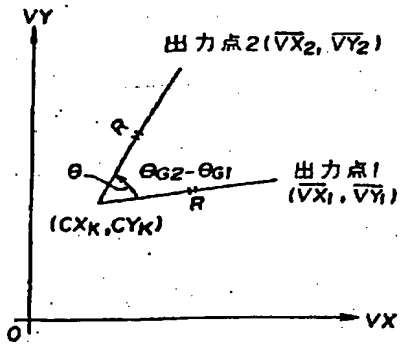
第8図



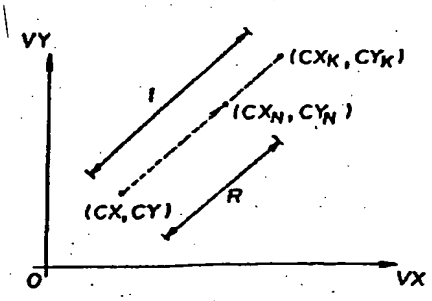
第10図



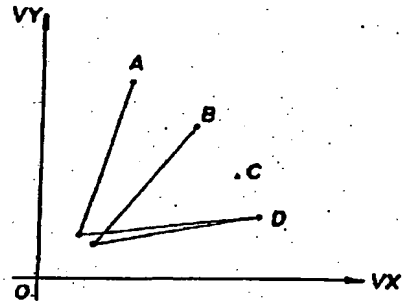
第11図



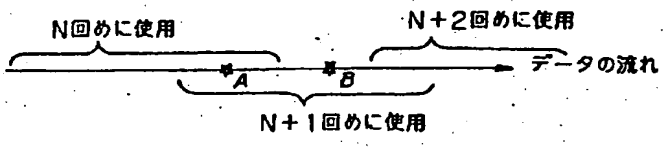
第12図



第13図



第14図



(57) Scope of Claim for Utility Model Registration

A vehicle traveling azimuth detection apparatus for dividing a geomagnetic component detected by a geomagnetic sensor into bidirectional components orthogonal to each other on a horizontal plane, and detecting a traveling azimuth of a vehicle, based upon a direction oriented to coordinate positions indicated by both of the geomagnetic components from a center coordinate value of an output circle in which the coordinate positions are to be included, said apparatus characterized by comprising:

gyroscopic traveling azimuth change quantity detection means for detecting a traveling azimuth change quantity by means of a gyroscopic sensor;

magnetic-field environment discrimination means for obtaining a difference between an output point movement quantity detected by the geomagnetic sensor on the output circle and an output point movement quantity detected by the gyroscopic sensor, and then, discriminating appropriateness of an ambient magnetic field environment based upon the movement quantity difference;

sampling data count calculation means for calculating a sampling data count of a geomagnetic sensor output value, based upon the discriminated magnetic field environment;

average value data storage means for storing average

value data on the sampling data over a plurality of points;

center point candidate value calculation means for calculating a center point candidate value of the output circle, based upon average value data on two points selected from average value data on the plurality of the stored points;

center point candidate value calculation precision computation means for computing calculation precision of the computed center point candidate value; and

center point correction means for correcting a center point between a conventional output circle center point and the calculated center point candidate value, based upon the computed center point candidate value calculation precision.

Brief Description of the Drawings

Fig. 1 is a view corresponding to the claim of the present invention;

Fig. 2 is a block diagram showing a basic configuration of equipment of an embodiment to which the present invention is applied;

Fig. 3 is a general flowchart illustrating operational procedures according to the equipment of the embodiment;

Fig. 4 is a flowchart illustrating operational procedures for azimuth position computation interrupt processing;

Fig. 5 is a flowchart illustrating operational procedures

for distance detection interrupt processing;

Fig. 6 is an illustrative view of an output point movement quantity detected by a geomagnetic sensor and an output point movement quantity detected by a gyroscopic sensor;

Fig. 7 is an illustrative view of computation of a minimum sampling data count;

Fig. 8 is an illustrative view of a reference variable E_R;

Fig. 9 is an illustrative view of a reference variable E_G;

Fig. 10 is an illustrative view of a reference variable E_T;

Fig. 11 is an illustrative view of an output point candidate value detection operation;

Fig. 12 is an illustrative view of a center point correction operation based upon calculation precision;

Fig. 13 is an illustrative view of a combination of average value data pushed into a stack area B; and

Fig. 14 is an illustrative view of a case in which common average value data is used at the time of previous processing and at the time of current processing.

1... Distance sensor

2... Geomagnetic sensor

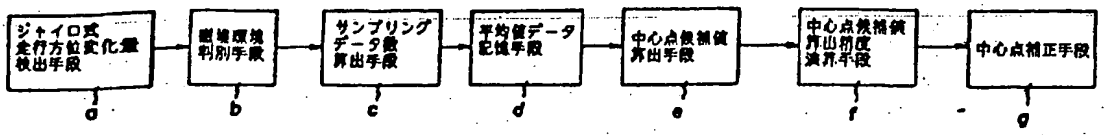
3... Gyroscopic sensor

4... Controller

5... Display unit

Fig. 1

第 1 図



a: Gyroscopic traveling azimuth change quantity detection means

b: Magnetic field environment discrimination means

c: Sampling data count calculation means

d: Average value data storage means

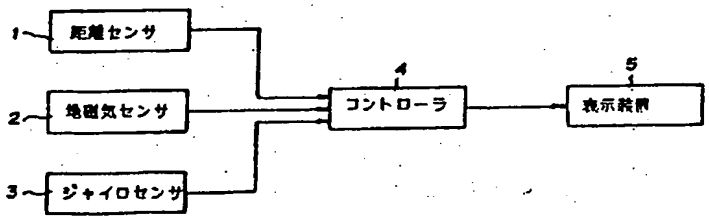
e: Center point candidate value calculation means

f: Center point candidate calculation precision computation means

g: Center point correction means

Fig. 2

第 2 図



1: Distance sensor

2: Geomagnetic sensor

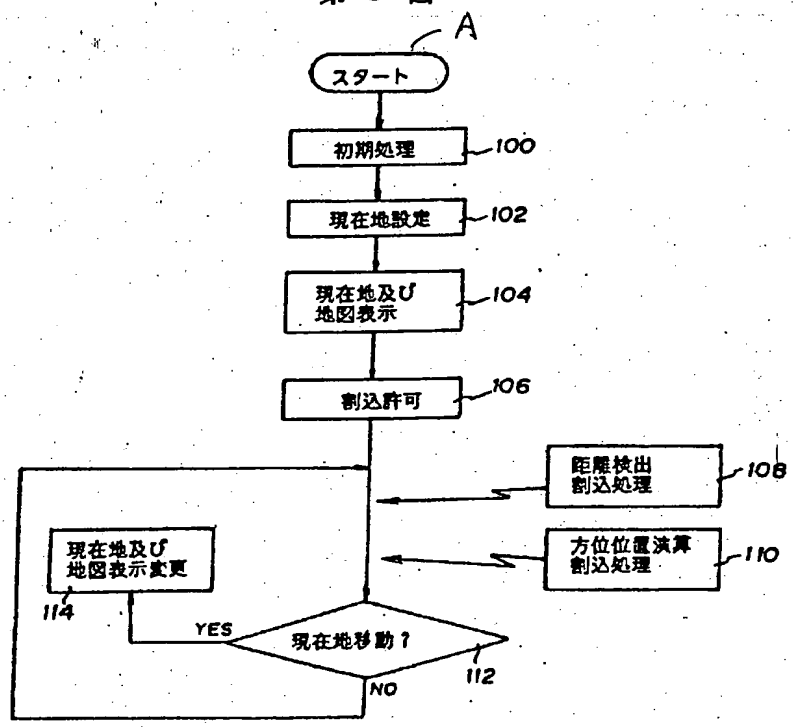
3: Gyroscopic sensor

4: Controller

5: Display unit

Fig. 3

第 3 図



A: Start

100: Perform initialization processing

102: Perform current position setting

104: Perform current position and map display

106: Perform interrupt permission

108: Perform distance detection interrupt processing

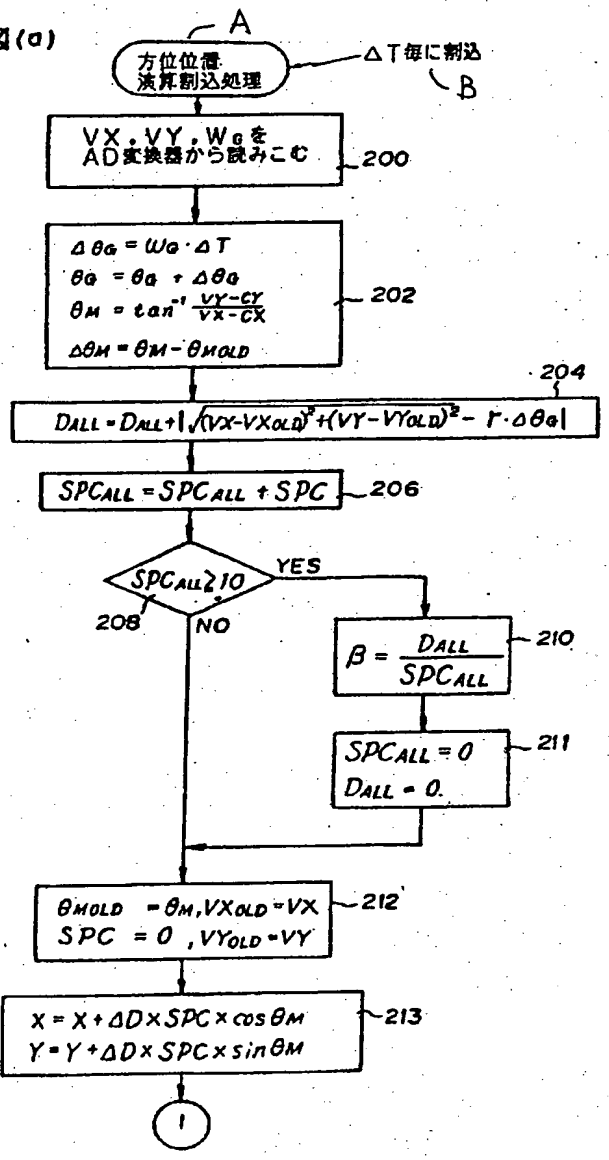
110: Perform azimuth position computation interruption processing

112: Current position moved?

114: Perform current position and map display

Fig. 4 (a)

第 4 図(a)



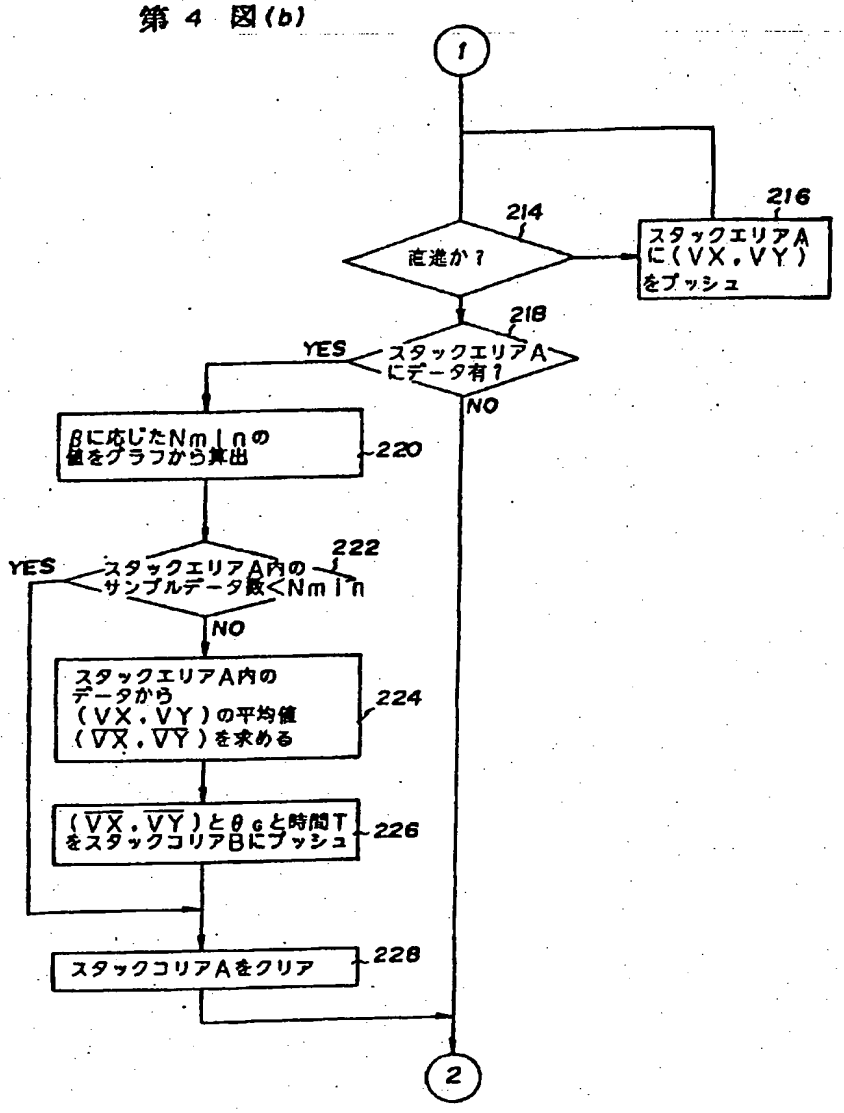
A: Perform azimuth position computation interrupt processing

B: To be interrupted by ΔT

200: Read VX, VY, and W_G from AD converter

Fig. 4 (b)

第 4 図(b)



214: Traveling in straight line?

216: Push (VX, VY) in stack area A

218: Is data present in stack area A?

220: Calculate value of N_{min} according to β from graph

222: Sample data count in stack area A < M_{min}

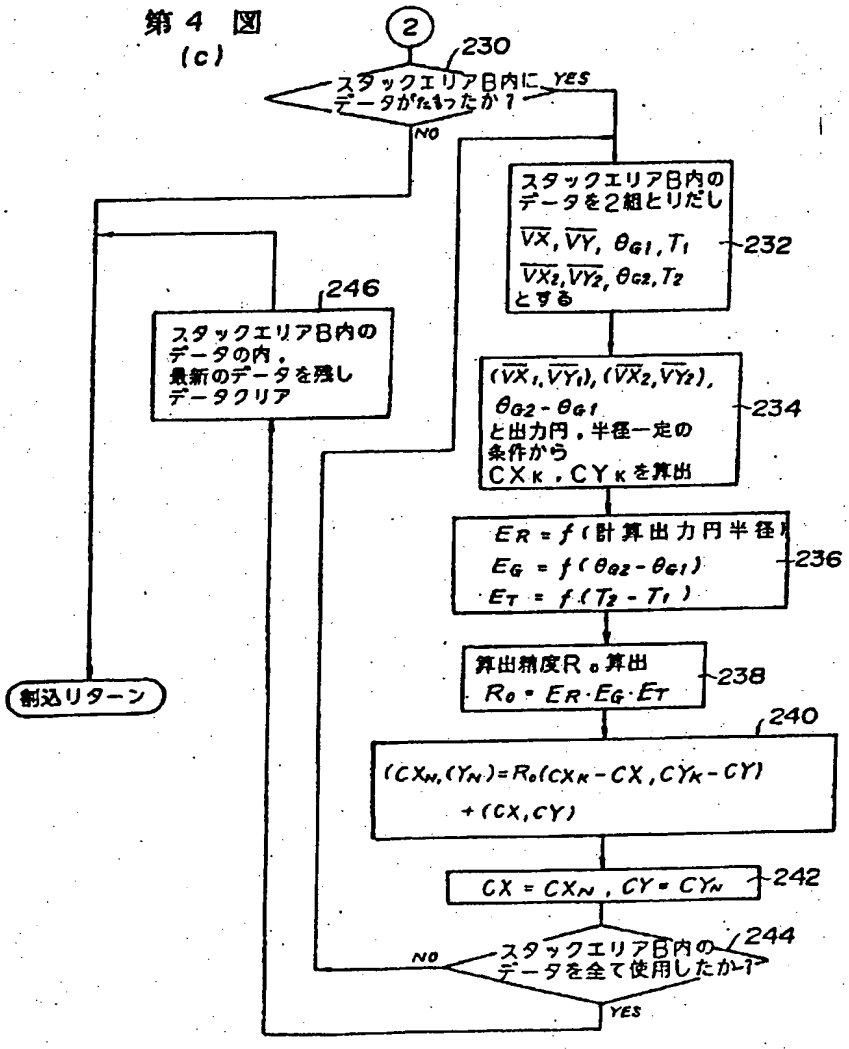
224: Obtain ($\overline{VX}$, $\overline{VY}$) which is average value of (VX, VY) from data included in stack area A

226: Push ($\overline{VX}$, $\overline{VY}$), θ_G, and time T in stack area B

228: Clear stack area A

Fig. 4 (c)

第4図 (c)



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230: Data accumulated in stack area B?

232: Extract two sets of data from stack area B and define $\overline{VX_1}$, $\overline{VY_1}$, θ_G, T_1, $\overline{VX_2}$, $\overline{VY_2}$, θ_G, T_2.

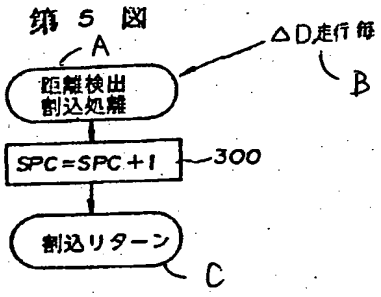
234: Calculate CX_k, CY_k from $(\overline{VX_1}, \overline{VY_1})$, $(\overline{VX_2}, \overline{VY_2})$, $\theta_{G2} - \theta_{G1}$ and output circle; and a condition that radium is constant

236: (Calculated output circle radius)

238: Calculate calculation precision R_0

244: Have all items of data included in stack area B been used

Fig. 5



A: Perform distance detection interrupt processing

B: To be detected per travel distance ΔD

C: Perform interrupt return

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Fig. 6

第 6 図

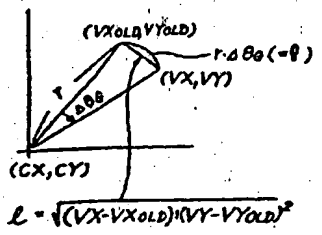


Fig. 7

第 7 図

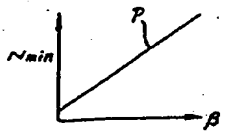
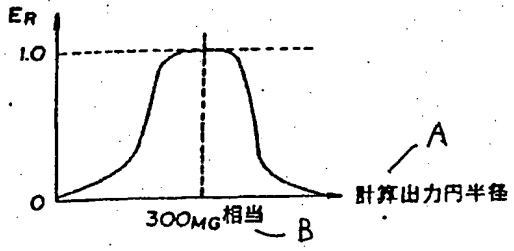


Fig. 8

第 8 図



A: Calculated output circle radius

B: 300_{MG} or equivalent

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Fig. 9

第 9 図

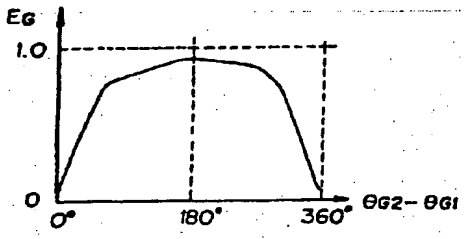


Fig. 10

第 10 図

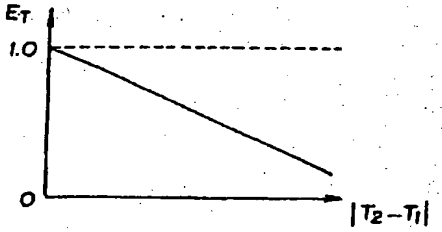
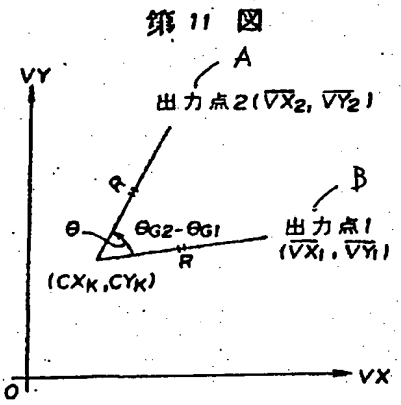


Fig. 11

第 11 図



A: Output point 2 ($\overline{VX_2}, \overline{VY_2}$)

B: Output point 1 ($\overline{VX_1}, \overline{VY_1}$)

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Fig. 12

第12図

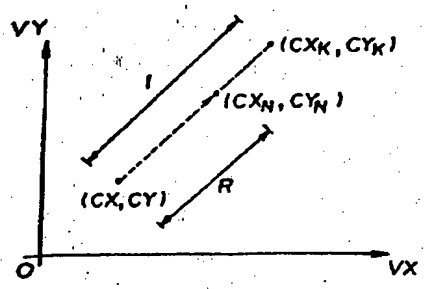


Fig. 13

第13図

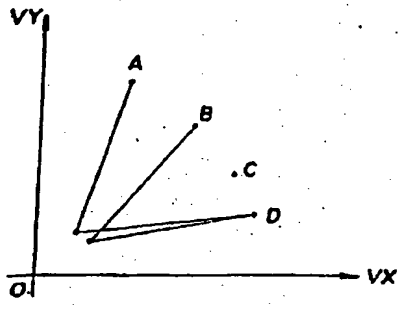
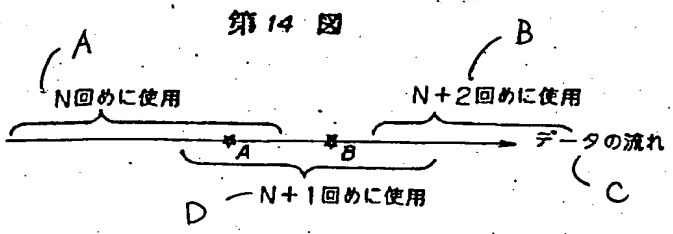


Fig. 14

第14図



A: To be used at N-th time

B: To be used at N+2-th time

C: Data flow

D: To be used at N+1-th time

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